Operating Instructions

VEGADIS 176

Digital indicating instrument without external energy for front panel mounting

Document ID: 47916

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Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained specialist personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbols used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.

Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.

Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

SIL applications
This symbol indicates instructions for functional safety which must be taken into account particularly for safety-relevant applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

1 **Sequence of actions**
Numbers set in front indicate successive steps in a procedure.

Battery disposal
This symbol indicates special information about the disposal of batteries and accumulators.

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2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

2.2 Appropriate use

VEGADIS 176 is a digital indicating instrument for 4 … 20 mA circuits.

2.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

The safety approval markings and safety tips on the device must also be observed.

2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

The device fulfills the legal requirements of the applicable EC guidelines. By affixing the CE marking, we confirm successful testing of the product.

You can find the CE Certificate of Conformity in the download section of our homepage.

2.7 NAMUR recommendations

NAMUR is the automation technology user association in the process industry in Germany. The published NAMUR recommendations are accepted as the standard in field instrumentation.

The device fulfills the requirements of the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility of equipment
- NE 43 – Signal level for malfunction information from measuring transducers

For further information see www.namur.de.

2.8 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfill this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- Digital indicating instrument VEGADIS 176
- Mounting material
- Documentation
  - this operating instructions manual
  - Ex specific safety instructions (with Ex versions), if necessary further certificates

3.2 Principle of operation

Application area

VEGADIS 176 is a digital indicating instrument for measured value indication in 4 … 20 mA circuits. The measured value is displayed via the LC display, the digital indication can be scaled. The instrument is suitabe for front panel mounting.

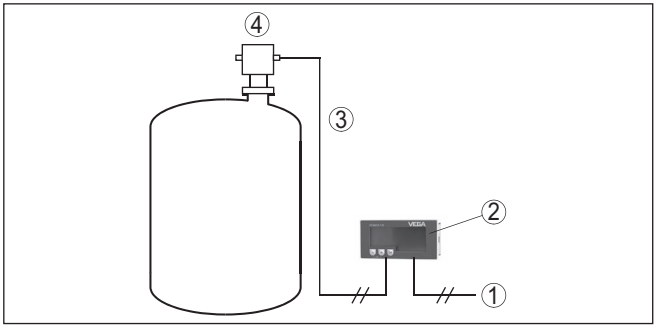


Fig. 1: Connection of VEGADIS 176 to the sensor

1 Voltage supply/Signal output sensor
2 VEGADIS 176
3 4 … 20 mA signal cable
4 Sensor

Voltage supply

VEGADIS 176 is looped directly into the 4 … 20 mA circuits and requires no separate external energy. Connection is carried out via a detachable plug with spring-loaded terminals in the housing.

3.3 Operation

Adjustment is carried out via keys in the front plate of the instrument.

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE

foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 … 85 %

4 Mounting

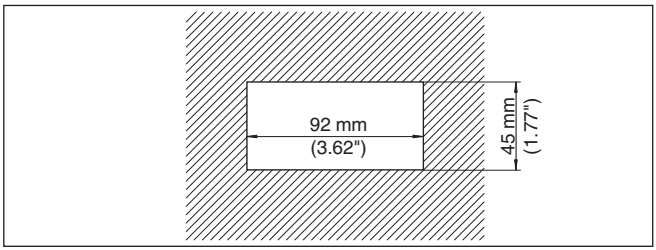
4.1 General instructions

Mounting location, installation position

The instrument is designed for use in a front panel. The installation position is horizontal.

4.2 Mounting preparations

Prepare panel cut-out 92 x 45 mm (3.62 x 1.77 in) according to illustration and DIN 43700. Max. panel thickness 13 mm (0.51 inch)



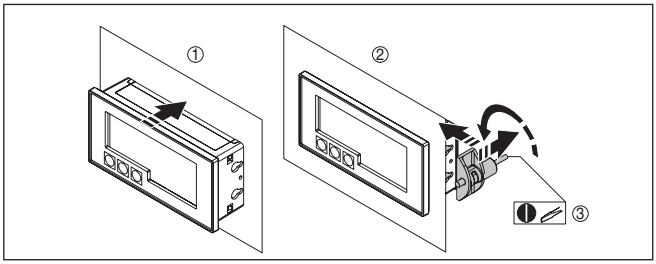
Required tools:

- Slotted screwdriver

4.3 Mounting steps

Proceed as follows:

1. Insert the instrument from the front into the cut opening



2. Attach mounting clips laterally on the housing
3. Tighten threaded rods steadily with the screwdriver

5 Connect to the signal circuit

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage

Take note of safety instructions for Ex applications

In hazardous areas you must take note of the respective regulations, conformity and type approval certificates of the sensors and power supply units.

5.2 Connection technology and steps

Connection technology

The voltage supply and signal output are connected via the spring-loaded terminals in the housing.

Connection procedure

Proceed as follows:

1. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires

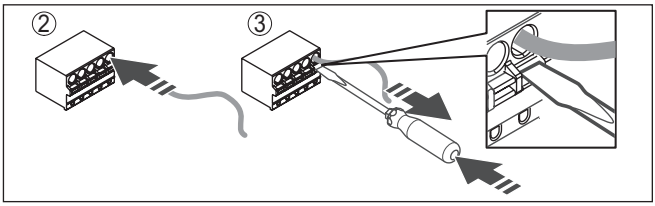


Fig. 4: Connection steps 2 and 3

2. Solid cores as well as flexible cores with cable end sleeves are inserted directly into the terminal openings.
3. In case of flexible cores without end sleeves, press the terminal from above with a small screwdriver, the terminal opening is then free. When the screwdriver is released, the terminal closes again.

Information:
You can find further information on the max. wire cross-section under "*Technical data/Electromechanical data*"

4. Check the hold of the wires in the terminals by lightly pulling on them
5. Connect screen to the potential equalisation terminal.

5.3 Wiring plan

Terminal assignment

The terminals are on the rear of the housing.

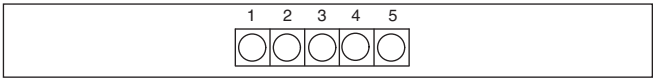


Fig. 5: Terminal assignment VEGADIS 176

Terminal	Function	Polarity	Notes
1	Output sensor	+	Display with backlight
2	Output sensor	+	
3	Output sensor	-	Bridged internally with terminal 4
4	Input voltage supply	-	Bridged internally with terminal 3
5	Input voltage supply	+	

The terminal for the potential equalisation is also on the rear of the instrument.

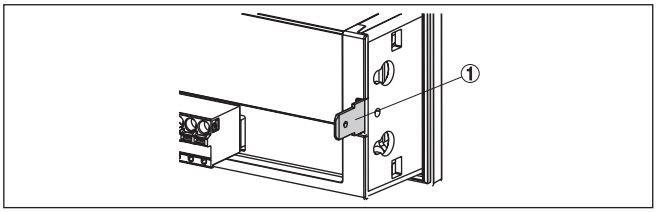


Fig. 6: Potential equalisation VEGADIS 176

1 Potential equalisation terminal

Connection to passive sensors

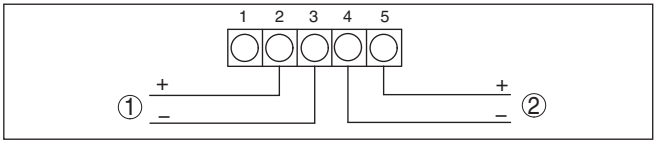


Fig. 7: Wiring plan VEGADIS 176 to passive sensors

1 To the sensor
2 To power supply or the processing system

Connection to passive sensors - with backlight

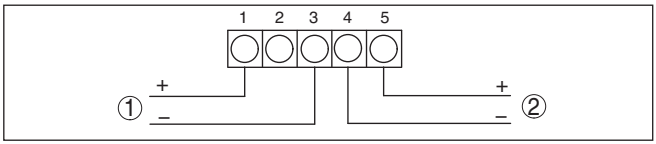


Fig. 8: Wiring plan VEGADIS 176 to passive sensors, with backlight

1 To the sensor
2 To power supply or the processing system

Connection to active sensors

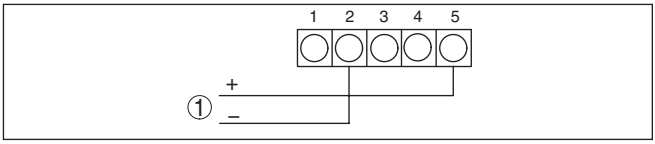


Fig. 9: Wiring plan VEGADIS 176 to active sensors

1 To the sensor

Connection to active sensors - with backlight

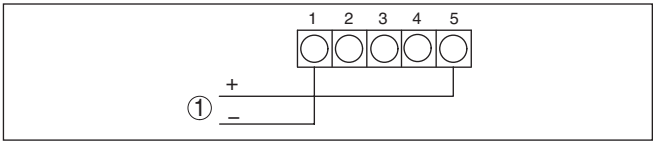


Fig. 10: Wiring plan VEGADIS 176 to active sensors, with backlight

1 To the sensor

5.4 Switch-on phase

After connecting the instrument to voltage supply or after voltage recovery, the instrument carries out a self-check for approx. 10 s and then displays the following:

- All display segments
- Firmware version, e.g. 1.02.00
- Status message, e.g. S901

Then the actual measured value will be displayed. You can find further information of the presentation in chapter "*Parameter adjustment - Menu Setup*".

6 Setup

6.1 Indication and adjustment

Display and adjustment elements

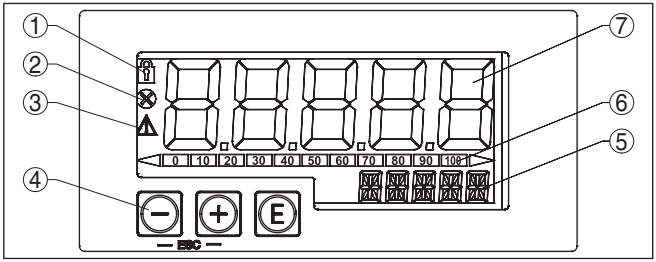


Fig. 11: Display and adjustment elements of VEGADIS 176

1 Symbol adjustment menu locked
2 Symbol error
3 Symbol upper/lower range
4 Adjustment keys
5 14-segment display for unit/TAG
6 Bargraph with marks for lower and upper range
7 5-digit 7-segment display for measured value

The adjustment is carried out via three buttons on the housing front.

Key	Function
E	Adjustment key – Invoke the adjustment menu – Confirm selection – Adjustment of parameters in the adjustment menu
−	Plus/minus buttons – Selection and adjustment/change of values in the adjustment menu – Pushing "-" and "+" simultaneously will cause a reset to the nixt higher menu level without saving the adjusted value (ESC)
+	

The device setup can be locked with a 4-digit user code. When the setup is locked, a lock symbol is displayed when invoking an adjustment parameter.

Adjustment system

The adjustment functions of the process indicator are structured in the following menus. The individual parameters and settings are described in chapter "*Setup*".

The display in the 7-segment indication can only display figures and not alphanumerical signal. Hence the procedure with number and text parameters is different.

Number parameters
If an adjustment position contains only numbers as a paramter, then the adjustment position is shown in the 14-segment display and the

adjusted parameter in the 7-segment display. Push the "*E*" key for editing and then enter the user code.

Text parameters
If the adjustment position contains text parameters, then first only the adjustment position is displayed in the 14-segment display. After pushing the "*E*" key again, the adjusted parameter is shown in the 14-segment display. For editing push the "+" key and finally enter the user code.

Return
The return is carried out:

- At the end of the individual menus and menu points with "*Back*" and pushing the "*E*" key to the next higher menu level
- After pushing "-" and "+" simultaneously (see table on top), to the next higher menu level up to the measured value indication
- Automatically 10 min. after the last key pressing to the measured value indication

In all cases, the EXPRT menu is again locked.

Note:
If the adjustment menu is locked by a user code, the individual menus and parameters can be displayed but not modified. To modify a parameter, the user coded has to be entered.

Adjustment menu

The following table shows the menu structure:

Menu	Function	Description
SETUP	Setup	Fundamental device settings
DIAG	Diagnostics	Device information, indication of error messages
EXPRT	Expert	Expert settings for the device setup. Editing in the menu Expert is protected through an access code (Default 0000).

6.2 Parameter adjustment - Menu Setup

Setup - DECIM

In this menu item you specify the number of decimal points for the indication.

Value range: 0 DEC, 1 DEC, 2 DEC, 3 DEC, 4 DEC

Setup - SC__4

In this menu item you specify the 5-digit number value (number of decimal points as set unter DECIM) for the scaling of the measured value at 4 mA.

Example: SC__4 = 0.0 means display 0.0 with measurement current 4 mA. The unit selected under UNIT is used in the display.

Value range: -19 999 … 99 999

Setup - SC__20

In this menu item you specify the 5-digit number value (number of decimal points as set unter DECIM) for the scaling of the measured value at 20 mA.

Example: SC__20 = 100.0 means display 100.0 with measurement current 20 mA. The unit selected under UNIT is used in the display.

Value range: -19 999 … 99 999

Setup - UNIT

In this menu item you select the unit for the display. By the adjustment "*USER*", a user-selectable unit can be entered in the parameter "*TEXT*".

Value range: %, °C, °F, K, USER

Setup - TEXT

By setting "*USER*" in "*UNIT*", a user-selectable unit can be entered.

Value range: Free text, 5-digit

6.3 Parameter adjustment - Menu Diagnosis

Diagnosis - AERR

In this menu item, acutally occurring diagnosis messages (Actual Error) are displayed. If the several message appear together, the message with the highest priority will be displayed.

Diagnosis - LERR

In this menu item, the last diagnosis message (Last Error) with the highest priority is displayed.

Diagnosis - FWVER

In this menu item, the firmware version is displayed.

6.4 Parameter adjustment - Menu Expert

The menu Export contains in addition to all menu items from the menu Setup also the submenus and menu items described, here. When invoking the expert menu, the user code will be enquired (UCODE, Default: 0000).

SYSTM - UCODE

With the user code, the device setup can be protected against unauthorized modifications. When the setup is locked, the lock symbol will be displayed when invoking an adjustment parameter. With default setting "*0000*", the user code is not active, i.e. parameters in the setup can be modified without entering the code. For the expert menu, the code must always be entered, also with default setting.

Value range: 0000 ... 9999

SYSTM - FRSET

Resetting the device setup to default values.

By selecting "YES" and confirming with the "*E*" key, the instrument will be reset.

Value range: YES, NO

The following table shows the default values after a reset:

Menu	Submenu	Menu item	Default values
SETUP	-	DECIM	1 DEC
	-	SC__4	0.0
	-	SC__20	100.0
	-	UNIT	%
	-	TEXT	-
EXPRT	SYSTM	UCODE	0000
		FRSET	NO
	INPUT	DECIM	1 DEC
		SC__4	0.0
		SC__20	100.0
		UNIT	%
		TEXT	-
		CURVE	LINAR
		NAMUR	YES
		RNGLO	03.80
		RNGHI	20.00
		OFFST	0.0

INPUT-CURVE

Selection of the linearization curve for the measurement current. With this parameter the instrument can be adapted to a linear or square measurement signal.

Value range: LINAR, SQRT

INPUT-NAMUR

Specification of the error limits according to standard NAMUR NE 43

Value range: YES, NO

INPUT-RNGLO

Lower range limit. If the measured current falls below this limit, an error message is outputted.

Only visible with NAMUR = NO

Value range: 00.00 ... 99.99

INPUT-RNGHI

Upper range limit. If the measured current exceeds this limit, an error message is outputted.

Only visible with NAMUR = NO

Value range: 00.00 ... 99.99

INPUT-OFFST

Entering an offset value for indication of the measured value.

Value range: -19999 ... 99999

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7 Maintenance and fault rectification

7.1 Maintenance

If the instrument is used properly, no special maintenance is required in normal operation.

7.2 Rectify faults

Causes of malfunction

VEGADIS 176 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measure is to check the sensor output signal according to the operating instructions manual of the respective sensor. In many cases the reasons can be determined this way and faults rectified. System errors of VEGADIS 176 are displayed via the system error message of the following chart:

Check the 4 … 20 mA signal

Connect a multimeter in the suitable measuring range according to the wiring plan.

Error code	Cause	Rectification
4 … 20 mA signal missing	Wrong connection to voltage supply	– Check and correct, if necessary, according to chapter "*Wiring plan*"
	No power supply	– Check cables for breaks; repair if necessary
	Operating voltage too low or load resistance too high	– Check, adapt if necessary

In Ex applications, the regulations for the wiring of intrinsically safe circuits must be observed.

Error limits - NAMUR NE 43

The instrument can be adjusted to error limits according to NAMUR NE 43. If one of these values is violated, then the instrument displays a diagnosis code.

Error limit with current value I	Error	Diagnosis code
I ≤ 3.6 mA	Lower range	F100
3.6 mA < I ≤ 3.8 mA	Unpermitted measured value	S901
20.5 mA ≤ I < 21.0 mA	Unpermitted measured value	S902
I > 21 mA	Upper range	F100

Sensor diagnosis

The instrument has diagnosis functions for the sensor. If an error is detection, the instrument wil display a diagnosis code.

Diagnosis code	Short text	Rectification measure
F100	Sensor error	– Check electrical wiring – Check sensor – Check sensor parameter adjustment
S901	Input signal too low	– Check sensor output on defect and deviation of characteristic – Check sensor parameter adjustment
S902	Input signal too high	

Electronics diagnosis

The instrument has diagnosis functions for the own electronics. If an error is detected, a diagnosis message will be displayed.

Diagnosis code	Short text	Rectification measure
F261	Electronics module	Replace electronics
F283	Memory content	– Restart instrument – Carry out device reset – Replace electronics
F431	Factory calibration	Replace electronics

Configuration diagnosis

Diagnosis code	Short text	Rectification measure
M561	Display exceeded	Check scaling

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is manned 7 days a week round-the-clock. Since we offer this service worldwide, the support is only available in the English language. The service is free, only standard call charges are incurred.

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "*Set up*" may have to be carried out again.

7.3 How to proceed if a repair is needed

You can find a repair form as well as detailed information on how to proceed at www.vega.com/downloads and "*Forms and certificates*".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

If a repair is necessary, please proceed as follows:

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please contact the agency serving you to get the address for the return shipment. You can find the agency on our home page www.vega.com.

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8 Dismount

8.1 Dismounting steps

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

8.2 Disposal

The display and adjustment module consists of materials which can recycled by specialised recycling companies. We have purposely designed the components to be easily separable.

WEEE directive 2002/96/EG

This display and adjustment module is not subject to the WEEE directive 2002/96/EG and the respective national laws (in Germany, e.g. ElektroG). Pass the display and adjustment module directly on to a specialised recycling company and do not use the municipal collecting points. These may only be used for privately used products according to the WEEE directive.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

9 Supplement

9.1 Technical data

General data	
Materials	
– Housing front	Aluminium
– Housing	Sheet steel galvanized
– Rear of the housing	Polycarbonate PC
– Inspection window of the indication	
Installation position	Horizontally
Weight approx.	0.3 kg (0.661 lbs)

Ambient conditions	
Ambient temperature	
– Function range	-40 … +60 °C (-40 … +140 °F)
– Read area	-25 … +60 °C (-13 … +140 °F)
Storage and transport temperature	-40 … +85 °C (-13 … +185 °F)
Climatic class	Class B 2 according to EN 60654-1

Electromechanical data	
Terminals for wire cross-section up to	
– solid, flexible	1.5 mm^2 (AWG 16)
– Strand with end sleeve and plastic sleeve	0.5 mm^2 (AWG 21)

Display and adjustment elements	
Indication	LC display, 5-digit
Height of figures	17 mm (0.67 in)
Indication range	-19999 up to +99999
Adjustment elements	3 keys (-/+/E)

Signal and supply circuit	
Operating voltage via 4 … 20 mA circuit max.	30 V DC
Voltage drop with current value 4 … 20 mA	
– Without lighting max.	1.0 V
– With lighting max.	2.9 V
Current range	3.6 … 22 mA
Overcurrent resistance	200 mA (fuse protection, supply side)
HART signal	Not influenced (HART-transparent)

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Deviation	
Deviation[1]	< 0.1 %
Signal resolution	> 13 bit
Influence of the ambient temperature[2]	< 0.1 %/10 K
Reference temperature	25 °C ±5 °C (77 °C ±9 °C)
Start-up time	10 min.

Electrical protective measures	
Protection rating	
– Front side	IP 65
– Rear side	IP 20
Protection class	III
Overvoltage category	II, degree of pollution 2

Approvals

Instruments with approvals can have different technical specifications depending on the version.

For that reason the associated approval documents of these instruments have to be carefully noted. They are part of the delivery or can be downloaded under www.vega.com via "*VEGA Tools*" and "*Instrument search*" as well as via "*Downloads*" and "*Approvals*".

9.2 Dimensions

VEGADIS 176

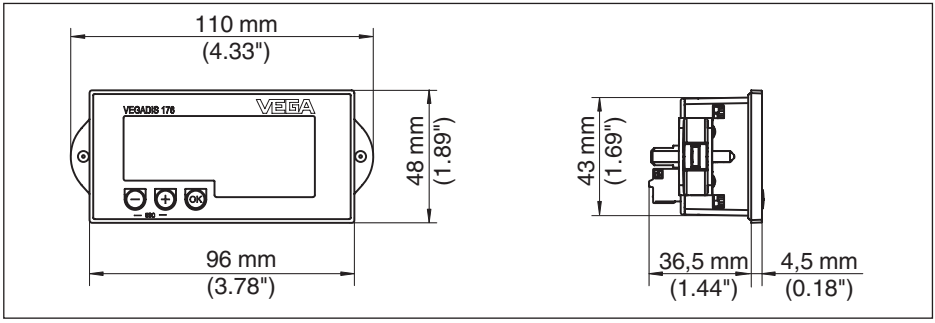

Fig. 15: VEGADIS 176

[1] Relating to the measuring range
[2] Relating to the measuring range

9.3 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see www.vega.com.

Only in U.S.A.: Further information see patent label at the sensor housing.

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